DOCUMENT RESUME

ED 422 895 IR 019 038

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TITLE Using Technology To Strengthen Employee and Family Involvement in Education.
SPONS AGENCY Partnership for Family Involvement in Education (ED), Washington, DC.
PUB DATE 1998-00-00
NOTE 45p.
CONTRACT ED-98-PO-1027
AVAILABLE FROM Partnership for Family Involvement in Education, 600 Independence Avenue, SW, Washington, DC 20202-8173; toll-free phone: 1-800-USA-LEARN; World Wide Web: http://www.ed.gov/PFIE
PUB TYPE Reports - Research (143)
EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Business; Case Studies; Community Involvement; Cooperative Learning; *Corporate Support; *Corporations; *Educational Improvement; Educational Needs; Elementary Secondary Education; Family School Relationship; *Information Technology; *Partnerships in Education; Professional Development; *School Business Relationship
IDENTIFIERS Computer Use; *Technology Integration; Technology Utilization

ABSTRACT

Businesses have an important role in integrating information technologies into the workplace both to increase productivity and to facilitate employee communications with their children's schools and improve learning. This report is an important guide to further these kinds of connections. Through a variety of research, survey data, and case studies about corporate experience this report demonstrates how businesses can use technology to foster, guide, and strengthen employee and family involvement in education within both their companies and their communities through efforts that: support professional/skills development for teachers, families, and students; strengthen community-based learning; better prepare the workforce; support educational improvement for special populations; and make technology integral to schooling and learning. Challenges and solutions are outlined and results of a survey of 12 companies and organizations whose programs include the use of technology to strengthen employee and family involvement in education are presented. Individual company/organization profiles include: Hewlett-Packard Company: HP E-Mail Mentor Program; Arthur Andersen and Co.: School of the Future Program; American Business Collaboration for Quality Dependent Care: Bridge Project; IBM Corporation: Wired for Learning-Reinventing Education Projects; Microsoft Corp.: Anytime Anywhere Learning Program; Boston Private Industry Council: The Boston Compact's Community Learning Centers; AT&T: Learning Network; Mattell Foundation/Alliance for Technology Access: Family Learning Program; Nortel: Teacher Training Program; Cisco Systems, Inc.: Cisco Networking Academy Program; Family Education Network: A Free and Simple Web Site; and Scholastic Inc./Center for Applied Special Technology: WiggleWorks. (AEF)

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Corporate Experiences

- Hewlett-Packard Company: HP E-Mail Mentor Program
- Arthur Andersen & Co.: School of the Future Program
- American Business Collaboration for Quality Dependent Care: Bridge Project
- IBM Corporation: Wired for Learning—Reinventing Education Projects
- Microsoft Corp.: Anytime Anywhere Learning Program
- Boston Private Industry Council: The Boston Compact's Community Learning Centers
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Using Technology to Strengthen Employee and Family Involvement in Education

By Susan D. Otterbourg

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Executive Summary

By themselves, technologies are only tools. They cannot create new products, solve problems, or deliver quality work instrumental to the prosperity of the United States. They are only effective when put to use by those who can master them. Today's students must have access to such technologies in order to become masters of today's knowledge and meet national demands for qualified workers, educated consumers, and responsible citizens. But in some communities with school budget cutbacks, overcrowded classes, poorly trained teachers, and limited parental involvement, students are not being prepared well enough to meet those demands.

- Almost 60 percent of U.S. schools are low-tech, lacking adequate classroom technology and, at best, having only outdated and inadequate technology.
- Only 67 percent of high school math classes, 19 percent of English classes, and 3 percent of social studies classes integrate technology into learning.
- Elementary and middle schools are not utilizing technology to communicate with parents: Only 12 percent use World Wide Web sites and 11 percent use e-mail.

The scenario is not hopeless, however. U.S. schools are projected to have spent about $5.2 billion on educational technology during school year 1997–98, a 21 percent rise from 1996–97. By 1998, they are expected to spend $12 million for online and subscription-based services, double the amount spent in 1995. In addition, the number of schools with Web sites jumped from 134 in January 1995 to 2,850 in June 1996. And 87 percent of schools that do not have access to the Internet plan to secure access in the near future.

The rising awareness of technology's importance, combined with nationwide concerns that the future workforce will be ill-prepared to fill technology and knowledge positions, has led corporate America to take an active role in helping students meet high academic expectations, standards, and achievements. With both the financial and human resources to lead the effort, businesses across the United States have joined with partners from the public and private sectors to create a variety of programs that infuse technology into schools, train teachers to become more familiar with computers and the Internet, and forge a stronger link between parents and their children's education.

Still, the challenge to use technology to foster, guide, and strengthen employee and family involvement in education efforts is monumental. Six major hurdles exist, but effective partnerships and projects have begun to successfully chip away at them.

Limited Parental Involvement

Lack of time appears to be the largest barrier to family involvement in education. The increase in the number of single-parent households, those with dual income

earners, and those with parents working more than one job, has led to a sharp decline in how much time is spent helping children with their education. Such integral involvement also suffers from many parents who do not feel that schooling is their responsibility or who lack self-confidence in school settings. Others simply do not know how to get involved.

Corporate experiences that focus on this challenge include:

- The **American Business Collaboration for Quality Dependent Care**'s Bridge Project (designed by WFD, Inc.) uses voice-messaging technology to help connect parents and teachers. Parents in communities where 22 "champion" corporations have a visible presence can access information via touch-tone telephone at any time.

- The **FamilyEducation Network** has built a free, easy-to-use Web site that encourages parents to learn more about their children's schools and the educational world at-large. The site can be accessed by computers at school computer labs, public libraries, other community centers, and parents' offices.

Technology Illiteracy Among Teachers and Students

Acquiring computer skills and the ability to use technology to improve learning and productivity is critical for students to achieve high academic performance, yet many teachers and schools are still on the fringes of the Information Era. Only 14 percent of public school teachers had more than eight hours of training in educational technology during the 1993–94 school year. And as of 1996, 18 states still did not require training in technology for all teachers seeking certification.

- **Nortel**'s Teacher Training Program helps address the computer technology needs of local school teachers in North Carolina. Nortel employees, who developed and wrote training manuals, volunteer their Saturdays to train teachers and administrators at the company's Research Triangle facilities. On an individual basis and at no cost, teachers have been trained in a broad range of beginning and advanced programs.

Unequal Community-Based Learning

Low-income students have much less access to technology in both schools and homes. In some urban and rural schools with high concentrations of low-income children, the student:computer ratio often exceeds the already high national average of 9:1. On the homefront, only 11 percent of families with an income of less than $20,000 owned a personal computer, compared with 56 percent for those with an income of $50,000.

- The **Boston Private Industry Council** recruits business support for The Boston Compact's Community Learning Centers, a citywide effort to connect all of the city's schools and community learning centers to the Internet with a starter network in each school. In addition to ensuring that all 125 Boston schools are online by fall 1998, private and public sector partners support rewiring of schools, reducing student:computer ratios, technology training for teachers and families, and technical assistance.

- **IBM Corporation**'s Wired for Learning-Reinventing Education Projects fosters communication and more active participation among school, home, and community by enabling delivery of information through the World Wide Web. Through a range of applications, registered user groups—parents, teachers, community members, and students—have "secure" access to a range of student learning information, work, and achievement any time from school, home, offices, community centers, and other networked community locations.

A Poorly Prepared Future Workforce

Business and community organizations are facing growing demands for qualified knowledge workers. Current needs cannot be met, and associated challenges relating to future productivity, recruitment, retention, and company growth are mounting. By 2000, 60 percent of jobs will require skills with information technologies. But studies from around the country reveal a future workforce that is not up to the task. For example, in Virginia, only 38 percent of applicants who apply for technical positions have the necessary skills. And in Maryland, 38 percent of 335 surveyed employers reported that a lack of skilled workers has had a negative impact on their ability to do business, and 43 percent said that skilled-worker shortages have prevented them from expanding their facilities.

- **Cisco Systems, Inc.**'s Networking Academies, a partnership program of schools, government, and industry, educates and certifies high school and college students to design, build, operate, and maintain computer networks through a program that provides teacher training, a Web-based curriculum, and a complete suite of lab equipment. This enables graduates to be strong network administrators, designers, and troubleshooters.

- **Hewlett-Packard Company**'s HP E-Mail Mentor Program uses telementoring to match HP volunteers with students in math, science, communication, and career/education planning. Through exchanges with HP professionals worldwide, students see how math and science are used every day, which strengthens their sense of the relevance of these subjects to their future life as adults.

Overlooking Special Populations

Many of the parents who feel uncomfortable in school settings do not speak English as their first language or have children with disabilities. They require additional support to be involved with their children's education, but workplace support is often limited or non-existent and school schedules that foster greater involvement are frequently inconvenient. They remain largely uninformed about special instructional materials and methods required of them to support their children at home. Further, teachers who work with special student populations are often isolated and do not have access to the most current technologies.

- **Scholastic Inc.** and the **Center for Applied Special Technology** have collaborated in the publication of WiggleWorks, an early-literacy, bilingual series that also incorporates universally designed CD-ROMs for each book. This software can be used by everyone including children with learning disabilities, physical challenges, sensory impairments, and reading challenges, as well as those with extraordinary abilities.

- **Mattel Foundation**, in partnership with the **Alliance for Technology Access** to support the Family Learning Program (FLP), brings technology into the lives of students with special needs. Through the imaginative application of computer technology, Mattel's FLP provides participants with the hardware, software, wiring, and technical support necessary to go online as well as with a closed listserve and Web site for schools to share resources and creations, find pen pals, and make other online connections.

Technology as an Ancillary Tool

Technology is currently not integrated as a tool to manage, deliver, and inform instruction throughout and across academic disciplines. Although computer training is gradually becoming more available to teachers, more than 50 percent of teachers do not have access to training for integrating technology into the classroom and making it integral rather than purely ancillary to the core of instruction.

- **AT&T**'s Learning Network is designed to bring AT&T technology and extensive support services to every public and private elementary and secondary school in the United States. The Learning Network's free online support services includes a teacher tutorial on how to use the Internet; a Web tour to guide teachers through various education-related uses of the Web; and AskLN, an exclusive mentoring/coaching program for teachers, by teachers, on how to integrate technology into lesson plans and classroom activities.

- **Arthur Andersen & Co.**'s School of the Future Program has designed a fundamentally new education system, a modern version of a one-room school that uses technology to support self-directed learning. Management and delivery of instruction through the use of technology tools encourages learners to navigate varied pathways of knowledge and to work effectively in teams.

- **Microsoft Corp.**'s Anytime Anywhere Learning Program partners with schools and families to provide students and teachers access to a personal computer and online information anytime, anywhere. Students are taking responsibility for their own learning, and the laptops and software allow teachers to customize instruction to fit students' individual needs.

Early results of business partnerships are promising, but it is still too soon to gauge the impact of technology on student performance, the management and delivery of instruction, and family and employee involvement in education. Certainly, business' wealth of practical experience with technology has enabled viable programs to develop and flourish in the 1990s where none had existed before. As technology becomes more firmly implanted in schools, such business-led programs aimed at making students, teachers, and families more technologically competent and involved with one another are bound to proliferate.

Introduction

"In today's fast-paced, information-based world, in which we seem to have ever less free time, it is important to develop innovative, practical, and productive ways to help parents find the time to connect with their children and communities to strengthen the bonds with their schools. Technology can be this kind of tool, by supplementing traditional learning, providing creative methods of teaching, and building and enhancing links between businesses, families, and schools. Businesses have an important role in integrating these kinds of technology into the workplace both to increase productivity and to facilitate employee communications with their children's schools and improve learning. This report is an important guide to what we can and should do to further these kinds of connections."

—Richard W. Riley
U.S. Secretary of Education

The future success of the United States depends on the ability of today's students to meet national demands for high-tech workers, educated consumers, and responsible citizens. Students with technology skills can create new products, solve problems, and deliver quality work instrumental to the prosperity of the United States. If all of today's students do not have access to technology opportunities, their future and, indeed, the future of the nation itself are in jeopardy.

Preparing students for a high-tech future is a monumental challenge that no one stakeholder group can overcome alone. Family involvement is a key ingredient in efforts aimed at helping young Americans meet high educational expectations, standards, and achievement. However, such involvement will only partially succeed if it stands in isolation. When combined with dedicated participation from corporate America, the potential for great progress can be harnessed to break the barriers of time and place to achieve bottom-line objectives for a wide range of stakeholders: employers and employees, families, schools, teachers, students, and the community-at-large.

How can business help meet these challenges as a community stakeholder? What roles can it play in this effort? And how can technology tools be used to support, facilitate, and guide this process of strengthening employee and family involvement in education? *Using Technology to Strengthen Employee and Family Involvement in Education* provides some answers to these questions through a variety of research, survey data, and case studies about corporate experiences.

This report demonstrates how businesses can use technology to foster, guide, and strengthen employee and family involvement in education within both their com-

panies and their communities through efforts that:

- support professional/skills development for teachers, families, and students;
- strengthen community-based learning;
- better prepare the workforce;
- support educational improvement for special populations; and
- make technology integral to schooling and learning.

Business believes that investments in technology can help increase a school's capacity to accomplish its goals, efficiency, and effectiveness. With technology comes many new and complex management issues for schools (as it has for business). Technology can be used to:

- communicate between families/homes and schools on student progress and school activities;
- automate a range of administrative tasks (budgets, purchasing, hiring, scheduling, maintenance);
- help schools make better decisions about the management and delivery of instruction;
- provide access to and improve professional development;
- improve learning and students' attitudes about learning;
- assess, analyze, and report student performance, and use data to improve student learning; and
- develop and implement a school's technology infrastructure, including investments in hardware and software, maintenance, upgrading, networks, software research and development, and ongoing coordination and support.

Business also knows that the understanding, use, and application of interactive digital technologies foster exploratory environments. Children who talk and listen while working on school projects can be stimulated, engaged, and sustained in verbalization, discussion, and collaborative learning. Interaction, collaboration, and problem-solving (as well as self-confidence) are also furthered through computer simulations, telecommunications, long-distance learning, and telecommunications connections to real-world resources.

Challenges and Solutions

Although technologies are transforming all aspects of daily life, it is important to remember that they are only tools; their success is not in being, but in being used successfully to help accomplish particular goals and objectives. The discussion that follows examines challenges and solutions to using technology to strengthen employee and family involvement in education. When examining these challenges and solutions, areas of focus include: family involvement in education; access and equity; technology literacy; achieving demonstrated results; and investment costs.

Employee and Family Involvement in Education

The Challenges

Family involvement is usually limited to monitoring a child's homework assignments (especially in the early grades) and course selection (usually at the school's request).

Even fewer parents report involvement in school governance activities such as attending meetings of the local school board or getting involved in an advisory council or other group that helps set school policy.

Yet, the type of parent involvement that appears to make the most significant

Family Concerns About Technology and Their Children's Education

Although many parents feel that technology has become a requirement for being an informed citizen and a productive worker, they say their children are not taught enough mathematics, science, and computer technology.

> Eighty percent of the American public feels that teaching computer skills is "absolutely essential" and that it is important to provide the public schools with access to global electronic systems such as the Internet.[1]
>
> More than 75 percent of parents have encouraged their children to use a computer; 86 percent of this group believes that a computer is the most beneficial and effective product they could buy to expand their children's opportunities.[2]
>
> Fifty-seven percent of households with a combined annual income of more than $40,000 have a personal computer, compared with 12 percent of low-income homes with a combined income of less than $20,000.[3]

1 Jean Johnson, *Assignment Incomplete: The Unfinished Business of Education Reform* (New York: Public Agenda, October 1995).

2 U.S. Department of Education, *Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge* (Washington, D.C., June 1996).

3 Jan Hawkins, *Technology in Education: Transition, CCT Reports*, Issue No. 15 (New York: Education Development Center, Inc., March 1996).

difference in student achievement is that which physically draws the parent into school, such as attending school programs, tutoring in the schools, helping improve the curriculum and standards, and back-to-school nights. Such involvement alerts students and the school that education is important.

A small percentage of American parents is involved in their adolescent children's education in any meaningful way. Family involvement in their children's education—even at its minimum—usually decreases in the middle and high school years.

- Seventy-two percent of students ages 10 to 13 say they would like to talk to their parents more about their homework.
- About one-sixth of all students report that their parents do not care whether or not they earn good grades in school.
- Only about 20 percent of parents consistently attend school programs; more than 40 percent never do.
- Only 33 percent regularly attend their children's extracurricular performances, such as athletic events or plays.[1]

If lack of parental interest is strongly associated with children's academic difficulties, low school achievement, and many adolescent problem behaviors (alcohol and drug abuse, delinquency and violence, suicide, sexual precocity, etc.), why aren't more parents involved? Although families and teachers want to form relationships or partnerships with each other, they lack the skills, information, dispositions, and opportunities to do so. In a September 1997 National Household Education Survey by the U.S. Department of Education, 56 percent of mothers in two-parent families were highly involved in their children's education, as opposed to 27 percent of fathers. In single-parent families, the involvement of lone parents was about equal (49 percent of single mothers and 46 percent of single fathers).

In another study of single working parents conducted by the Center for Work and Family, 63 percent of work-family managers reported that single-parent employees are concerned about their relationships with their children's schools, but they cite difficulties in maintaining regular communications with the schools and thus do not feel adequately informed about and sufficiently involved with the quality and content of their children's education.

The lack of time appears to be the largest barrier to parents' involvement in their children's learning. For instance, employed mothers now work an average of 65 hours per week. Additional research reveals:

- Mothers with young children, those working two jobs, and women in professional positions are working at least 70 hours per week.[2]
- Of adults who work 40 hours or less per week, 58 percent believe they do not have enough time with their children; 74 percent who worked more than 40 hours per week agree.[3]

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1 Laurence Steinberg, *Beyond the Classroom: Why School Reform has Failed and What Parents Need to Do* (New York: Simon & Schuster, 1996), p. 187.

2 Juliet B. Schor, *The Overworked American: The Unexpected Decline of Leisure* (New York: BasicBooks, A Division of Harper Collins, 1991).

3 Families and Work Institute Survey, 1992, in Dan Murphy and Katrina Waiters, *Barriers to Family Involvement in Schools* (Washington, D.C.: Policy Studies Associates, May 1996).

- Fully 30 percent of parents say they feel frustrated because they cannot find enough time to help their children at school; 23 percent cite difficulties created by the demands of raising other children.

- Nearly 20 percent of parents of elementary school students state that a key difficulty is getting time off from work to participate in events at their children's school.[4]

Parents do not see schooling as their responsibility. Some parents believe that schooling should be left to education experts, and that the family's role is one of caring and nurturing outside of school. Yet when parents are involved at school, children are more likely to perform well.

[4] *A Study of Attitudes Among the Parents of Primary-School Children, Hand in Hand: Parents, Schools, Communities United for Kids*, Marttilla & Kiley, Inc., 1995, p. 13

What Parents Want or Expect From Their Schools

Findings from a spring 1996 survey of parents of elementary and middle school students (Grades 1-8) on family involvement in education by the Partnership for Family Involvement in Education, the U.S. Department of Education, and the GTE Foundation revealed the following information:

- 88 percent reported that their children's schools treat them as important partners in encouraging their children to learn.

- 62 percent say teachers regularly communicate with them about their children's progress.

- 79 percent said they wanted to learn more about how to be involved in their children's learning and 77 percent said that teachers could learn more about how to do so.

- 62 percent of elementary school parents (compared with 45 percent of middle school parents) say their schools are better in reporting to parents about what students should be able to do and know.

- The new technologies are not widespread as tools for schools to communicate with parents. Seventy-six percent reported that their schools usually communicate with them through newsletters and phone calls; 21 percent used voice mail; 20 percent used community cable television; 12 percent used Web sites; and 11 percent used electronic mail.

- Computer classes, art and music courses, and community service rank high as activities for afterschool programs. Ninety-six percent of parents said their child would benefit from an after-school program that includes computer technology classes.

Note: Study conducted by the National Opinion Research Center at The University of Chicago.

- Only 43 percent of all parents think it is extremely important for them to be involved in activities at their children's school.

- Nearly 70 percent of parents believe that it is extremely important for them to spend time at home checking on homework, reading with their children, talking about events in school, and simply being there for their children.[5]

Some parents are uncomfortable and lack self-confidence in school settings. Of all parents, 32 percent say they find it hard to help their children because of new and different teaching methods; 21 percent say they would be more involved in schooling if they knew how to get involved.[6] Often they have had their own negative school experiences, face cultural barriers, or have language communication problems. Other parents cite difficulties in getting support from their workplace to attend events or conferences at their children's schools or from schools that decline to schedule more convenient opportunities for parent involvement.

Inadvertently, schools can be unwelcoming to parents. Teachers lack the time and resources to work with parents, fear parent interruptions and intrusions, and believe that parents do not really care about their children's education. Schools, like parents, often lack the knowledge or understanding of policies regarding how to involve parents.

During the last four years of its grassroots efforts conducting technology safety workshops for parents across the United States, the National PTA has taken a leadership role in addressing technology issues that concern parents—Internet safety, content quality, commercialism, marketing exploitation, security, and privacy. These fears of technology have not been isolated; the PTA sees parent education as critical to ensure understanding of technology as an essential tool in improving children's learning. It is expected that understanding will lead to funding to support schools' technology needs.

The Solutions

More than 30 years of private and governmental research has proven beyond dispute that there is a positive connection between family involvement and student success. Different types of family involvement produce different gains at all grade and age levels, but a family's *form* of involvement is not as important as the *variety* and *amount.*

The most accurate predictors of student achievement are not income or social status, but the extent to which families:

- create a home environment that encourages learning;

- express high (but not unrealistic) expectations for their children's achievement and future careers; and

- become involved in their children's learning in school and in the community.

Another important factor in raising student achievement appears to be the quality of the school's relationships (partnerships) with the families it serves, rather than the type of school or who goes there.

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[5] *A Study of Attitudes Among the Parents of Primary-School Children, Hand in Hand: Parents, Schools, Communities United for Kids*, p. 8.

[6] *A Study of Attitudes Among the Parents of Primary-School Children, Hand in Hand: Parents, Schools, Communities United for Kids*, p. 13.

Based on the U.S. Department of Education survey, technology can help address several areas of parent involvement:

- regular communication between teachers and parents on their children's progress;
- tips for parents on how they can help their children learn more;
- teacher ideas for how parents can be more involved in their children's learning; and
- additional strategies for middle and high school teachers and parents to communicate.

However, to have long-lasting gains for students, family involvement must be well-planned, inclusive, and comprehensive. Children perform best when their parents are enabled to play four key roles as teachers, supporters, advocates, and decision-makers.

Developing Teachers, Families, and Students

The Challenges

Technology literacy is the acquisition of computer skills and the ability to use computers and other technology to improve learning, productivity, and performance. For U.S. students, technology literacy is tied to high academic standards and preparation for their future life as adults, workers, consumers, and citizens. Schools are central to the achievement of this literacy, but for the most part, they are still on the edge of this information revolution:

- Although the percentage of schools using local area networks for instruction has increased by nearly 70 percent every year for the last four years, the Educational Testing Service determined that even where access to technology is available, low-income children's interaction with technology is primarily for purposes of isolated skills practice and remedial exercises.
- Few teachers have access to needed, long-term professional development, technical support, and collegial networking. Up to 50 percent of teachers have little or no experience with technology in the classroom, according to McKinsey & Co. The U.S. Department of Education finds that only 14 percent of public school teachers had more than eight hours of training in educational technology during the 1993–94 school year. Much of this professional development is structured as one-shot seminars, but such limited training cannot prepare teachers to use technology to manage and deliver instruction.
- As of 1996, 18 states still did not require training in technology for all teachers seeking certification.[7]

The Solutions

Community-wide training often becomes an integral part of this solution. School budgets need to be restructured to take into account long-term training costs. People preparing to become teachers, as well as veteran teachers, need ongoing training to explore new ideas and materials; follow-up consultation over an extended time period with mentors (when teachers return to classrooms and try to implement new practices); and opportuni-

[7] *Education Week, Quality Counts: A Report Card on the Condition of Public Education in the 50 States*, January 22, 1997 in Richard J. Coley, John Cradler & Penelope Engel, *Computers and Classrooms: The Status of Technology in U.S. Schools*, Policy Information Center, Educational Testing Service, 1997.

ties to exchange ideas with colleagues and observe other teachers (to view exemplary practices and the process of change).

Business support to educators. Some corporate efforts that address skill development needs include online professional support networks, training, and telementoring that assist in solving technical glitches, give tips on how to access particular information, and share lesson plans that effectively integrate technology into teaching and learning. Teacher participation in this professional development can be via satellite, fiber optics, cable, and online and other distance learning delivery systems.

Turnkey efforts to encourage family involvement. Business support to high- and low-tech networks has helped extend offerings of parenting classes and seminars by educators. Families are helped to understand what and how well their children are learning and are encouraged to participate in activities to help them. As new learning concepts and strategies are internalized, families use this knowledge to support their children's learning at home, monitor homework, and increase communication with teachers, schools, and community learning centers. Networks also encourage families to participate more actively in children's learning outside the home or workplace through volunteering at schools and community learning centers, attending school events and activities, and serving on committees.

To extend family and community understanding of and support to technology as a tool to improve children's learning, the use and application of technology is being taught not only at schools, libraries, and community centers, but also where parents spend large parts of their day, such as work sites (at both large and small businesses), doctors' offices, repair shops, and hospitals. Emphasis is placed on encouraging computer acceptance and use for those who do not ordinarily use computers at work.

Strengthening Community-Based Learning

The Challenges

Unequal access for low-income students in schools. The U.S. Department of Education reports that in 1994, approximately 35 percent of U.S. schools had access to the Internet; in 1997, this percentage jumped to 78 percent. The percentage of instructional rooms in all public schools that were connected to the Internet increased from 3 percent in 1994 to 27 percent in 1997. From January 1995 to June 1996, the number of schools with World Wide Web sites increased from 134 to 2,850. The U.S. Department of Education also reports that 87 percent of schools that *do not* have access to the Internet plan to secure access in the future.[8]

In spite of some gains related to connectivity, there has been a persistent pattern of inequity and limited access to technology. Only 4 percent of U.S. public schools have a computer for every five students; the average student:computer ratio is nine to one.[9] In the 2 percent of schools with *no* connections in instructional rooms, students have little or no contact with the Internet. Even in instructional rooms with Internet access, students may not actually take advantage of that access. Use of computers in many elementary schools averages two hours per week, and these computers are mostly in stand-alone areas

[8] *Survey of Internet Access to the Schools*, 1994-1997, National Center for Education Statistics, U.S. Department of Education, February 1998.

[9] Quality Education Data, Technology in Public Schools, 15th Edition, 1996 in *School Technology and Readiness Report: From Pillars to Progress, Year One* (Washington, D.C.: CEO Forum on Education & Technology, October 9, 1997).

(e.g., computer labs that children frequent for short periods per week).

In some urban and rural schools—particularly small elementary schools—with high concentrations of low-income children, the numbers are often lower. High-tech schools (those having better-than-average computer intensity, CD-ROM intensity, a network system, and Internet access) are found in the more affluent areas where less than 15 percent of their students fall below the poverty line. As the percent of children within a district that falls below the poverty line increases above 16 percent, the presence of high-tech schools decreases.[10]

Unequal access for low-income students in homes. Low-income households are two or three times less likely to possess and use computers and network services than middle- and upper-income households. A college graduate with an annual family income of $50,000 is 5 times more likely to own a personal computer and 10 times more likely to have online capability in the home than a nongraduate who earns less than $30,000. Only 11 percent of households with an income under $20,000 and those who had not finished high school had a PC, compared with 56 percent of households with a family income above $50,000 and almost 65 percent of households with at least some post-graduate training.[11]

Children's use of computers appears to be almost entirely a function of whether there is a PC at home: In homes *with* computers, only modest differences were found across racial or income lines.

- 64 percent of households with computers use them for a combination of work, school, and personal activities.
- 46 percent of households with computers use them for school-related activities (e.g., homework).
- 85 percent of teenagers who have home computers use them for school-related tasks.
- 36 percent of parents said their children who used a PC "often" did word processing and 33 percent said they do so "sometimes."
- 40 percent of parents said their children used the computer "often" to help them with school work and 35 percent said they do so "sometimes."[12]

The Solutions

Technology is used to support community-based learning that connects schools and homes; schools, homes, libraries, and other community learning centers; and the family (at work) to school and home. Technology tools are also used to support after-school programs at schools and other learning/community centers.

Low- and high-tech to extend access and equity. This approach centers on providing access to learning opportunities as well as expanding and improving communications between families and schools, parent training, and families' ability to work with their children. Both low- and high-tech hardware and software are used to support community-based learning through telephones in classrooms, homework hotlines, interactive voice-mail systems, take-home

[10] *Technology in Education 1997*, Market Data Retrieval (Chelton, CT, September 1997).

[11] *Technology in the American Household*, Times Mirror Center for the People and the Press (Washington, D.C., May 1994).

[12] *Technology in the American Household*, pp. 9, 21, 28.

computers, educational CD-ROM programs, and access to schools or teachers from remote locations (work and home).

Leveraging connections through collaboration. Connectivity concerns the individual home and school, the workplace and home and school, and the home and/or school and other community learning centers. Long-term needs associated with this approach mandate collaboration at local, regional, national, and international levels. Through consortia, urban, rural, and suburban communities can access and leverage teaching and learning through technology, such as long-distance learning and the Internet.

Collaboration among stakeholders can more effectively connect communities to address issues concerning ongoing, regional technology requirements from planning and development of a technology infrastructure, to investment in hardware, software, and network connectivity, to technology maintenance, replacement, and upgrading. Individual businesses and/or consortia that include business as a major stakeholder provide the resources, knowledge, products, and applications to expand and leverage this community-based learning.

The challenge for communities, the private sector, state leaders, and individuals—including students and their families—is to match federal commitments and work together to reach these technology goals. And, for technology efforts to have a real return on investment, they must be linked to local and state educational improvement goals and comprehensive, continuing teacher education.

In response to the federal Technology Literacy Challenge, states and school districts have already developed long-range technology plans that include money for upgrading computer equipment, training, and community-based learning. Parents, community members, local businesses, and not-for-profit groups will provide assistance to schools in acquiring Internet access and other advanced telecommunications services. The major source of technology support continues to be the school districts themselves, followed by state and federal government funding.

At the state and local levels, alliances are forming among public school systems, the government, community groups, employers and employees, and families to facilitate training, networking, and sharing. This collaboration can leverage technology investments and reduce costs associated with the purchase of professional development and hardware, development of community-based learning networks, and investment in software development to meet local, state, and regional needs.

Preparing the Next Workforce

The Challenges

By 1994, 62 percent of the U.S. workforce was composed of knowledge workers whose primary job responsibilities focused on creating, organizing, and communicating information—and demand for such workers is growing, according to the *McKinsey Quarterly*. About 22,000 of these workers were teenagers, ages 16 to 19, who worked in the computer and data-processing industry in 1997—more than four times the number three years earlier.[13] Businesses are addressing current and long-term needs for skilled, qualified workers who can demonstrate their technical skills as well as the creativity, problem-solving, and the lifelong learning skills required in the new economy

[13] Eric L. Wee, "Teens with Tech Talent Rise to Top," *Washington Post*, March 1, 1998, p. A01.

by focusing on issues such as recruitment, retention, productivity, competition, employee and family well-being, quality of consumer life, and consumer loyalty. Two recent reports on employer needs in Virginia and Maryland put these concerns regarding knowledge workers into proper perspective.

Knowledge workers lacking in northern Virginia. A recent study by Ryan McGinn Samples Research, Inc. finds there is a current need for more than 19,000 technology employees in northern Virginia and an additional 112,000 technology employees over the next five years (at a cost of $400 million in recruitment expenses). The greatest demand is for computer programmers, information management specialists, electrical engineers, mechanical engineers, and structural engineers.

Currently, only 38 percent of applicants who apply for technical positions have the skills necessary to fulfill requirements for available jobs. Of the firms surveyed:

- 50 percent indicated that individuals with a four-year college degree represent their greatest need;
- 25 percent said their greatest need is for individuals with some college, technical training, or an associate degree; and
- 22 percent indicated their greatest need is for people with a post-graduate degree.

Bottom-line effects of insufficient knowledge workers in Maryland. A 1997 survey by the Maryland Business Research Partnership found that nearly 80 percent of Maryland firms that hire manufacturing or skilled-trades workers reported either some or a great deal of difficulty in finding qualified workers, particularly for high-tech jobs. The greatest demands are for qualified graduates from high school vocational programs and from college and university scientific and technical programs.

- 38 percent of the 335 employers surveyed reported that a lack of skilled workers has had a negative impact on their ability to do business in Maryland in 1997.
- 84 percent reported that worker shortages reduced productivity.
- 64 percent reported reduced ability to meet deadlines.
- 43 percent reported that skilled-worker shortages have prevented their company from expanding its facilities.
- 9 percent reported that worker shortages may force the firm to close or move some operations out of state.
- 73 percent reported experiencing problems with the communications skills of high school level workers.
- 69 percent reported problems with writing and reading skills.

To increase worker productivity or improve technology/technical skills, 68 percent of surveyed employers provided some form of employee training that ranged from $2,300 for training a new employee to $2,250 for training a professional employee to $1,375 for training a nonprofessional employee.

Job growth and education requirements. The U.S. economy is expected to add 18.6 million new jobs by 2006. From 1996–2006, service-producing industries will account for virtually all of the job

growth, including net gains of 3.6 million in business services, 3.2 million in health services, and 2.3 million in retail trade. Computer and data processing services is the fastest growing sector, expected to add 1.3 million jobs, twice the number previously projected by the Bureau of Labor Statistics.[14]

Education requirements and earnings of workers are quite varied among the 30 occupations that are projected to grow the fastest. It is estimated that 60 percent of jobs by 2000 will require skills with information technologies. These jobs are expected to pay 10 to 15 percent more than jobs that do not require such skills.[15]

Projections also show that differing growth prospects among occupations have important implications for education. While the economy will continue to generate large numbers of jobs at all education levels, the increasing role of technology means that at least half of the fastest-growing job opportunities (jobs that are higher paying as well) are most likely to require more extensive education and training and experience. More specifically, employment in occupations requiring an associate degree or higher will grow considerably faster than those with lesser education requirements. Growth rates from 1996–2006 will range from 7.4 percent for occupations generally requiring post-secondary vocational training to 25.4 percent for those requiring a bachelor's degree.[16]

It will be an enormous task to meet the current and future education and training needs of U.S. business. Changes in industry needs require new approaches to education; the extent of these changes will exceed those required when the U.S. education system was organized to meet the needs of the industrial age 100 years ago.

The Solutions

Technology plays an essential role in creating, guiding, and supporting the conditions of effective learning for all students. Technology tools can:

- help students take advantage of the ongoing rapid evolution of telecommunications and multimedia technologies;
- realize high standards;
- engage students in complex and meaningful problem-solving tasks;
- bring vast new resources to schools from libraries and other centers of learning;
- connect schools with homes and communities;
- help students learn the necessary skills to use these tools;
- support improved management and delivery of instruction through the professional development of teachers;
- extend workforce preparation at schools and business sites (for students and educators); and

[14] James C. Franklin, "Employment Outlook: 1996-2006: Industry and Employment Projections to 2006," *Monthly Labor Review* (Washington, D.C.: U.S. Department of Labor, Bureau of Labor Statistics, November 1997), p. 5.

[15] *America's Children and the Information Superhighway* (Washington, D.C.: The Children's Partnership, 1994).

[16] George T. Silvestri, "Employment Outlook: 1996-2006: Occupational Employment Projections to 2006," *Monthly Labor Review* (November 1997).

- expand additional opportunities for career and workforce preparation at community colleges and other post-secondary institutions, libraries, and community centers.

Not only is there a need to prepare post-secondary students for further education and training to meet business needs for a qualified workforce, but also to retrain and upgrade skills of existing workers. Business is using technology tools to develop necessary knowledge and skills and to ensure a better match between workplace requirements, expected worker qualifications, and the knowledge and competencies of high school, community college, and four-year college graduates.

Supporting Special Populations

The Challenges

As cited earlier, many parents are uncomfortable and lack self-confidence in school settings; this may be particularly true of parents with language communication problems and/or families of children with disabilities. These parents may require additional support from their workplace to support their "special" children, and that support may be limited or non-existent. School schedules that foster parental involvement are often inconvenient. Those parents who need greater assistance may also have little knowledge of the special management and instructional methods and materials required of them to support their children at home. Teachers who work with special student populations are often isolated and do not have access to the newest instructional technologies and materials to ensure expanded and improved student learning.

The Solutions

Technology is used to support educational opportunities and improvement for special populations, especially for the disabled and students and families with limited command of English. Business is paying particular attention to the use of technology tools that can more effectively meet these special needs through the development of adaptive technology, programs and software, resource and referral services, and multilingual hotlines.

Making Technology Integral to Learning

The Challenges

Technology is not integrated as a tool to manage, deliver, and inform instruction throughout and across academic disciplines, even though teachers who have been given the time and flexibility to integrate technology into curriculum and instruction have done so successfully. A Global Strategy Group Poll found that although 71 percent of teachers said that computer training was available, only 48 percent reported that they had access to training for integrating technology into classroom instruction. Only 19 percent of high school English classes, 67 percent of math classes, and 3 percent of social studies classes integrate technology into learning.[17]

The Solutions

Technology is made essential to learning through the curriculum, the management and delivery of instruction, strategic planning, and school governance. The importance business places on integrated learning is demonstrated by its support of the Internet, long-distance learning, maintenance and upgrade of software and

[17] Henry A. Becker, "Analysis and trends in school use of information and technologies," in Jan Hawkins, *Technology in Education: Transition*, CCT Reports (New York Education Development Center, Inc., Issue No. 15, March 1996), p. 9.

hardware, and maximizing the Universal Service Fund for schools and libraries. The approach focuses on bringing technology from the position of supplemental or tangential to central.

Results of Technology Link Still Scant

The Challenges

Knowledge about the kind and amount of technology used in schools, how it is used, the results of its use, the kind and degree of training and support teachers need, and its cost has been severely limited by a lack of any major studies that have demonstrated the tie between technology and improved student achievement. The success of technology applications is also understudied, as is the question of whether policy-makers spend the amount and quality of time needed to make decisions about investments in new technology infrastructures, hardware, and software, as well as maintenance and upgrading efforts. Too often, even the amount of technology that is already in schools and the ways it is used is unclear.

The Solutions

Despite the tremendous deficiency in information, some basic knowledge does exist. For instance, the quality of both local and state plans varies widely and limited resources of total technology budgets have been allocated for professional development. Also, some schools and school districts have established indicators to determine what is working. They are developing tools to monitor costs, time tables, and performance related to technology, its use by staff, and its impact on teaching, learning, and achievement.

Existing research on technology and education appears to demonstrate mixed results. Most users feel that it is too new to evaluate outcomes related to student achievement. But limited findings do indicate that motivation soars, attendance rates go up, and classroom isolation is reduced when students are able to use technology for interactive learning activities. Other positive results demonstrate the improvement of basic skills.

The first U.S. Department of Education-funded study of nine technology-rich schools concluded that the use of technology resulted in educational gains for all students regardless of age, race, parental income, or other characteristics. Key features of these schools' success are:

- concentrated, conscious, and explicit planning among school leaders, families, and students to create "learner-centered" environments;
- clearly articulated goals and challenging standards for student achievement;
- restructuring of the school to support the learner-centered environment and achievement of standards; and
- nearly universal access to computer technology.

Overcoming Prohibitive Costs

The Challenges

Almost 60 percent of U.S. schools are considered low-tech, lacking adequate classroom technology and at best having only outdated and inadequate technology.[18] In 1995, nearly 50 percent of school computer

[18] *School Technology and Readiness Report; From Pillars to Progress, Year One*, p. 4ff.

purchases were used to replace old and outdated computers, resulting in only a marginal increase in the number of machines available to students.[19] Only 3 percent of schools have fully integrated technology in the classroom.[20] On the human side, only 13 percent of all public schools reported that technology-related training for teachers was mandated by the school, district, or teacher-certification agencies.[21] Fifty percent of teachers cited the lack of time to train as the greatest barrier to integrating the Internet into the classroom.[22]

Schools face common barriers:

- Technology is just one of a number of competing school needs and priorities.
- Local community resistance to higher taxes limits districts' ability to raise additional revenue.
- Districts lack staff to expedite fundraising efforts.
- Some funding sources have restrictive conditions/requirements that make funding difficult to obtain.
- Technology components that are hardest to fund are maintenance, training, and technical support.
- Limited business contributions are often attributed to a lack of business understanding of the extent of schools' needs and/or the large number of competing demands on its resources from the community.

The Solutions

Breaking down the funding barrier. Funding is still a major barrier to achieving technology literacy goals, particularly in urban and rural schools. However, there is a growing bipartisan political commitment to investing in technology to support educational improvement. In 1994, 69 percent of schools said funding was a barrier; in 1995, the count fell to 55 percent.[23]

U.S. schools are projected to have spent an estimated $5.2 billion on educational technology during school year 1997–98, a 21 percent rise in spending from 1996–97. Increased spending on instructional software is projected at 49 percent and on hardware (mostly personal computers and servers) at 41 percent.[24] In 1995, schools spent $6 million for online and subscription-based services; this is expected to double by 1998.[25]

Concerns have been raised that school districts are throwing money away through one-time technology expenditures, expecting quick solutions to technology needs. In

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[19] *School Technology and Readiness Report; From Pillars to Progress, Year One.*

[20] *School Technology and Readiness Report; From Pillars to Progress, Year One*, p. 4ff.

[21] *Education Week, Quality Counts: A Report Card on the Condition of Public Education in the 50 States*, 1997.

[22] *School Technology and Readiness Report, From Pillars to Progress, Year One.*

[23] *Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge*, U.S. Department of Education, June 1996, pp. 29–30.

[24] Kerry A. White, "School Technology Spending on the Rise, Survey Predicts," *Education Week*, September 3, 1997, p. 19.

[25] *School Technology and Readiness Report; From Pillars to Progress, Year One.*

reality, funding challenges related to the planning, allocation, use, and monitoring of resources will be long-term and include:

- infrastructure investment (e.g., external connections, hardware, software, etc.);
- system maintenance, replacement, and upgrading of infrastructure, hardware, and software;
- telecommunications access;
- technical support and coordination;
- technology training to prepare new teachers and provide professional development for experienced teachers and school administrators;
- associated building improvements (wiring, access, connectivity); and
- the involvement of families and other community stakeholders from the public and private sectors.

Collaboration among federal, state, and local stakeholders. The federal government has been addressing the enormous investment and costs required for technology efforts at local, state, and national levels. Through its Telecommunications Act of 1996 (in effect in January 1997), federal legislation provides "E-Rate" discounts, administered by the Schools and Libraries Corporation, a not-for-profit organization established by the Federal Communications Commission (FCC). The legislation allows for up to $2.25 billion in annual discounts for Internet access, internal connections, and local and long-distance phone rates to schools and libraries. Moreover, the Technology Literacy Challenge, announced by President Clinton and Vice President Gore in February 1996 (and totaling $531 million in 1998), is designed to energize the nation to make young Americans technologically literate by the turn of the century through achievement of four goals:

- All teachers will have the training and support they need to help students learn to use computers and the information highway.
- All teachers and students will have access to modern multimedia computers in their classrooms.
- Every classroom will be connected to the information highway.
- Effective software and online learning resources will be an integral part of every school's curriculum.

A January 1998 report to Congress by the U.S. General Accounting Office, *School Technology: Five School Districts' Experiences in Financing Technology Programs*, relates how rural, suburban, and urban school districts are addressing technology needs through local, state, and federal collaboration. All five districts, which included two cities, chose to allocate from 16 to 77 percent of district funds from operating budgets for technology. The two cities competed for and won federal five-year Technology Innovative Challenge Grants. All of the districts figured out how to use federal and state program funding that was not specifically designated for technology, but could be used for this purpose. All districts recruited assistance (grants, and monetary and in-kind donations) from businesses, foundations, and individuals. District/school fundraising activities and parent-teacher activities rounded out recruitment activities to support technology efforts.

Conclusion: Business-Education Partnerships Can Make a Difference

"The good news is that education is first on everybody's agenda. This also means that the expectations for results are enormous. Failure and low performance cannot be in our vocabularies. How can we reach the kinds of goals inherent in the technology agenda that President Clinton has laid out for us? It is one thing to say that we are going to put technology in our classrooms, that we are going to wire our classrooms to the Internet and the Information Age, that we are going to have every teacher in the United States feel comfortable and competent in using technology, that the applications of technology will cut across the curriculum, and that all of this will make a difference. But we all know that doing it has to happen at the ground level of every community where a set of common goals and a common framework pull things together from businesses, schools, and communities."

—Linda Roberts
Director, Office of Educational Technology
U.S. Department of Education

There are no longer questions about whether new technologies will be used in schools. Nearly everyone agrees—and for the most part enthusiastically—that students, teachers, and schools must have access to technology tools for teaching and learning, career preparation, improving student achievement, managing and delivering instruction, and connecting schools, families, students, and communities to strengthen communications and access to global resources.

In and of themselves, technologies almost never cause substantial change in schools. Where there has been change, a complex set of factors—along with the introduction of technologies—is planned, developed, organized, coordinated, and implemented. In other words, technology tools play key roles in this process when they are appropriately introduced, applied, and used.

Early results are promising, but it is still too soon to know the long-term direct or indirect impact of technology on student achievement, the management and delivery of instruction, and employee and family involvement in education. New research designs, procedures, strategies, and tools must be developed to meet the special needs associated with monitoring and evaluating these initiatives.

Many of technology's roles have yet to be defined, or even discovered. Currently, the

major education focus for technology concerns the issues of access, use, and management of technology resources and experimentation with various technology models. What is the result? Technology is placing great demands on schools and school support services; currently most schools are having difficulty in meeting or addressing these demands.

The acquisition of technology literacy requires guidance and support services that are too costly and complex for most schools to coordinate and manage on their own. What schools need are partners to help them achieve their goals. Good partners will come from the community, business, and local, state, and national government. Business, particularly, has had a wealth of practical experience: learning about technology, using technology, and applying technology to meet its bottom-line needs. The corporate experiences described in the following case studies speak to what business can do—using technology—to strengthen employee and family involvement in education.

Corporate Experiences

Business can help address these challenges, its own needs, and those of families, schools, and communities as a key community stakeholder. The Conference Board surveyed 12 companies and organizations whose programs include the use of technology to strengthen employee and family involvement in education. Survey results yielded the following information:

Demographics

- The companies are from industries including telecommunications, networking, accounting, publishing, oil, insurance, financial services, high-tech, and educational publishing.
- Work sites are in local, state, regional, national, and international locations.
- Company-wide workforce populations range from fewer than 100 to more than 200,000.

Issues That Spurred Company Efforts

- Workforce skill needs
- Community relations, including consumer loyalty and local, state, and national school improvement
- Technology capability of schools, teachers, and students
- Local schooling (level of student achievement, dropout rate, etc.)
- The gap between what students are learning and what business needs
- Mobilizing communities to accomplish school improvement goals
- Employee and family well-being

History

- More than 50 percent have had their technology in education efforts in place from two to five years.
- Nearly 20 percent had their initiatives in place from five to eight years.
- More than 25 percent had their effort in place for more than eight years.
- Approximately 50 percent say that the planned length for their multi-year efforts is open-ended; the remainder have set the years 2000 or 2001 as a cut-off date, subject to review of outcomes.

Management Structures

- Structures range from within one company department or division to company-wide.
- Senior management—whether CEOs, a city's mayor, and/or managers of company-wide business units or divisions—have championed the efforts.

Needs Assessment

- Companies determined how technology would be used as a tool to support their efforts through internal company audits of

employer, employee, and family concerns and community audits.

- Assessment strategies included market research, assessing customer needs, benchmarking, review of reports and studies identifying needs and current best practices, focus groups and task forces, interviews, and participation in blue ribbon commissions.

- Following the assessments, companies and their partners set priorities, standards, goals, and objectives to address identified needs.

Target Groups for Company Efforts

Primary: students (pre-K–12), families, employees, other employers (in collaborative efforts), teachers and school administrators, and community groups and leaders.

Secondary: national education-related and other nonprofit organizations, government, and higher education.

Technology Tools

- Training
- Computers
- Technical assistance
- Online information access
- LAN/WAN components
- Internet access
- Monitors
- Software manuals
- Speakers

Methods to Overcome Challenges

- Consistent and clear communication.

- Clear guidelines for schools and other community learning centers in relation to company-sponsored efforts.

- Collaborative procedures and strategies to ensure long-term stakeholder support and participation.

- Maintenance and/or expansion of strong company management support and volunteer efforts.

- Becoming a catalyst for purposes of program development, expansion, and leveraging.

- Adapting the training provided to schools/school districts to focus on strategic uses of technology rather than specific "how-to" instructions. (Company employees become trainers, mentors, and consultants for teachers and administrators. To overcome teachers' fear of change, training includes ongoing seminars and workshops, opportunities for sharing best practices via listserves, Web sites and conferences, and/or sponsorship of national training companies that provide low-cost and specific curriculum integration training. The training can take place in centers off-campus where teachers feel less constrained to ask questions and experiment and continue on an as-needed basis.)

- Educating school leadership about the need for staffing through company volunteers and loaned executives.

- Ensuring that company efforts are adequately staffed in order to respond efficiently and effectively to partners.

- Ongoing monitoring, review, renewal, and adjustment of a company's initiative to maintain relevance, timeliness, and effectiveness via numerous strategies:

  - letters of commitment from school personnel;

  - modeling the expanded uses of technology;

  - providing schools with ideas that have worked in other communities to maintain project momentum;

  - establishing incentives programs to encourage ongoing participation and commitment from schools and employee volunteers; and

  - allocating and monitoring the use of resources (financial, human, materials/equipment) for training for leadership and participation.

- Expanding equal access by working to provide a range of solutions at varying price points to facilitate the sharing of best funding models from community to community, and to provide flexible license agreements that allow schools to rent equipment to those that cannot afford to buy them.

- Helping schools and other community centers to maximize the Universal Service Fund and leverage additional financial support from foundations and state and federal agencies through community collaboration and matching opportunities.

Monitoring and Assessment Tools That Document Results

- Anecdotal evidence or word of mouth

- Media reporting (print, radio, television)

- Reports

- Records

- Surveys/questionnaires

- Awards to the company

- Expanded employee volunteerism

- Internal and external studies

- Contracted evaluations

Documented results reported for the company and its employees (with or without children):

- Expanded family and employee involvement in education

- Increased family and employee use of technology to support learning

- Improved company image, morale, and balance of family life and work life

Documented results of community, school, family, and student efforts using technology:

- Support for and improvement in the preparation and skills of the entering workforce, high academic standards, and student achievement
- Support for school's access to technology
- Increased educator use of technology to manage and deliver instruction and curriculum
- Connectivity of employers and employees to schools, homes, and other community centers of learning
- Help to schools and community learning centers to upgrade their technology (infrastructure, hardware and software, connectivity)

Through creative uses of technology, 12 companies and organizations (see pages 31–42 are successfully bringing together other stakeholders to strengthen employee and family involvement in education. These efforts appear to cut across all areas of support. However, program emphasis is placed on:

- support to professional/skills development for teachers, families, and students (Nortel: Teacher Training Program);
- strengthening community-based learning (American Business Collaboration for Quality Dependent Care: Bridge Project; FamilyEducation Network: A Free and Simple Web Site; Boston Private Industry Council: The Boston Compact's Community Learning Centers);
- better preparation of the workforce (Cisco Systems, Inc.: Networking Academies; Hewlett-Packard Company: HP E-Mail Mentor Program);
- support for educational improvement for special populations (Mattel Foundation/Alliance for Technology Access: Family Learning Program; Scholastic Inc./Center for Applied Special Technology: WiggleWorks); and
- making technology integral to schooling and learning (Arthur Andersen & Co.: School of the Future Program; Microsoft Corp.: Anytime Anywhere Learning Program; AT&T: Learning Network; IBM Corporation: Wired for Learning—Reinventing Education Projects).

Hewlett-Packard Company: HP E-Mail Mentor Program

The Hewlett-Packard (HP) E-Mail Mentor Program was launched in January 1995 to help students in math, science, communication, and career/education planning. HP employees from around the world are matched with 5th–12th grade students and a pilot group of students at the University of Arizona. Currently 1,100 students are being served in the United States, Canada, Australia, and France. Each student is matched with one employee in a telementoring relationship that is supported by a supervising teacher who guides the student and mentor as they work on academic projects throughout the school year. Telementoring was the vehicle selected because it allows thousands of students and employees to form productive mentoring relationships that would not exist under normal circumstances. The Internet and related technologies represent a potential to match thousands of students with successful business professionals—the first time in U.S. history where this has been possible.

Benefits for Students

HP mentors help students understand what it takes to be a successful professional in today's business world. Through these exchanges with industry professionals, students develop a concept of education that goes far beyond the traditional classroom. Seeing how math and science are used at HP every day strengthens the students' sense of relevance of these subjects to their academic careers and the professional world.

"Students become frustrated with math and science, especially when they do not see the connection to how it might be of use to them in the future," explains HP mentor Mary Jones of Loveland, Colorado. "Nothing helps change their attitude better than talking to someone who uses science and math theories to create useful products. Of course, every student won't need to work in an R&D lab, but all students will need to know how to efficiently prove their ideas in practical ways. What better way to teach this skill than to have them practice with math and science?"

For students in remote areas of the country, these discoveries can change their perception of what life and their future hold for them. For example, a female high-school student in Palmer, Alaska, was interested in medical research, but felt limited by her remote location and the lack of scientists in her area. Through correspondence with her HP mentor, she is now developing a research topic, making connections through e-mail with scientists who are interested in her specific area of research, and applying for a scholarship that may enable her to conduct this research.

Benefits for HP Mentors

HP employees enjoy the program for several reasons. Participation in the program:

- provides a sense of personal reward from helping students excel academically and personally;
- develops a better understanding and appreciation of the educational needs of today's students and teachers; and
- enables their involvement in K–12 education without leaving the HP site and with minimal time commitment (less than 10 minutes per day).

The Future of Telementoring

Based on the demand for the HP E-Mail Mentor Program, Hewlett-Packard has decided to create an International Telementor Center by partnering with the Mid-Continent Regional Education Lab in Aurora, Colorado. The center, which will open in 1998, will allow many corporations, small businesses, and professional organizations to get involved in telementoring. The goal of the center is to serve a minimum of 10,000 students per year within the first five years of operation. The HP E-Mail Mentor Program will be administered thrmmough thmism center.

Contact: Bess Stephens, Education Program Manager,
Hewlett-Packard Company, 3000 Hanover St. 20BU, Palo Alto, CA 94304
650-857-2857, www.mentor.external.hp.com, www.telementor.org/charter/

Arthur Andersen & Co.: School of the Future Program

Arthur Andersen's School of the Future Program, begun in 1989, aims to design a fundamentally new education system whose results can be demonstrated to the nation and the world. After seven years of research and development and working with schools to prototype various elements, the Arthur Andersen Community Learning Center (AACLC) was opened in September 1996 in partnership with the Alameda California Public Schools. The AACLC accommodates up to 150 students, ages 12–18, in a modern version of the one-room schoolhouse.

The learning environment of the AACLC makes pervasive use of technology to support self-directed learning. This allows the learners to navigate varied pathways and the resulting diversity of knowledge creation allows them to access one another's knowledge and to work effectively in teams.

Arthur Andersen continues to provide ongoing project and teacher support to the AACLC. For example, it is assisting in the design of a "Learning to Learn" program and assessment tools and techniques. The company has also sponsored an update of the Community Vision and the development of a "constitution" drawn up by the learners to govern the AACLC. The program has inspired a number of Arthur Andersen's U.S. and international offices to lead in local school improvement programs.

Arthur Andersen also provides various publications and tools to help its employees participate in a broad range of school improvement efforts in their local communities. Employees in approximately 100 countries have access to online databases of global best practices in education and to Andersen professionals who are part of the School of the Future team and are available to support local community initiatives.

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American Business Collaboration for Quality Dependent Care: Bridge Project

The Bridge Project is a technology and training initiative developed with funding from the American Business Collaboration for Quality Dependent Care. Twenty-two Champion Companies and their local corporate partners have committed to invest $100 million in communities where their employees live and work. The Champion Companies include: Aetna, Allstate Insurance Company, American Express, Amoco Corporation, AT&T, Bank of America, Chevron Corporation, Citibank, Deloitte & Touche LLP, Eastman Kodak Company, Exxon Corporation, GE Capital Services, Hewlett-Packard Company, IBM Corporation, Johnson & Johnson, Lucent Technologies, Mobil Corporation, NYNEX/Bell Atlantic, Price Waterhouse LLP, Texaco, Inc., Texas Instruments, and Xerox Corporation. These companies support the Bridge Project through:

- funding for schools to acquire state-of-the-art voice-mail technology;
- training for school districts on how to use this technology to improve teacher-family communication;
- training for teachers on how to script and record effective messages that will keep parents up-to-date with what is happening in the classroom and with homework assignments; and
- strategies to communicate the project to employees, other parents at the school, and the community-at-large.
- The project uses voice-messaging technology to help connect busy parents and teachers so they can work together to ensure student success. Teachers in Bridge Project schools have a voice mailbox where they can record a daily message for parents regarding school activities, homework assignments, and suggestions to support learning at home. School-wide information about events, lunch menus, PTA/PTO meetings, and sports schedules can also be made available through voice-mail. Parents can access this information via touch-tone telephone at any time.

School-based messaging technology provides the capability for teachers to record messages in more than one language to reach parents who do not speak English. In addition, many schools use two-way voice messaging so parents can leave private messages for their children's teachers. Many systems also provide a "call-out" function that permits the schools to reach parents for emergency notification at home or at work (e.g., school closings because of a snowstorm, buses arriving late from a field trip, etc.), alert parents to their child's absenteeism, and send good news home such as the names of students who have made the honor roll.

The Bridge Project, developed by WFD, Inc. in consultation with Dr. Jerold Bauch at Vanderbilt University, has shown that, when implemented correctly, voice-mail communication systems can have significant results on a school community: 50 percent of parents access the system every day, teacher-parent communication increases approximately 500 percent, and homework completion and attendance improve.

Currently, voice-messaging systems are installed and teachers trained in 129 schools in which 109,000 children are enrolled; 3,400 of these students are children of sponsoring company employees. Approximately one-half of collaborators' employees say they are now more involved in their children's education and that their children are completing more homework as a result of the Bridge Project. More than one-third of collaborators' employees say the project has helped them balance work and family responsibilities and reduce family stress.

the bridge project
CONNECTING PARENTS AND SCHOOLS THROUGH VOICE MESSAGING

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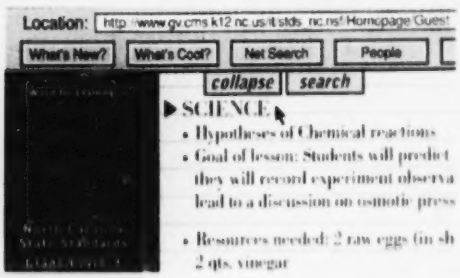
IBM Corporation:
Wired for Learning: Reinventing Education Projects

Through Reinventing Education partnerships with the Charlotte-Mecklenburg Schools and the Durham Public Schools in North Carolina and the Detroit Public Schools in Michigan, IBM is implementing Wired for Learning as a means of fostering better communication among parents, teachers, community members, and students. Wired for Learning enables delivery of information through the World Wide Web, while ensuring that confidential data is maintained with the highest degree of security (especially critical in the K–12 environment, where information on students, conferences between parents and teachers, and discussions among teachers must be kept private).

Wired for Learning provides registered user groups—parents, teachers, community members, and students—with a customized, online setting from which they can obtain appropriate information on a range of student learning experiences, with a special focus on student work. The software then enables them to take a more active and supportive role in children's education without ever stepping foot in the classroom.



From their Wired for Learning desktop, parents have access to a range of applications that provide them with virtual entree into their children's classrooms and schools. By using the "private conferencing" application, they can communicate with their child's teachers at night or on weekends—times that until now were considered off-hours. Wired for Learning encourages conversations to focus on student work; from the same desktop, parents can examine their children's completed and evaluated assignments. They can also gauge how their children are performing in relation to specific educational criteria by viewing a special databank that contains district and state academic standards. To enable participation in all aspects of children's learning, parents can access a school calendar that details current classroom activities, upcoming field trips and school events, and lunch menus.

Teachers logging onto Wired for Learning have access to a range of applications that help them manage their classrooms for greater efficiency and effectiveness. In addition to being able to communicate with their students' parents, teachers can use the "instructional planner" application to develop unit and lesson plans online. This application incorporates both the standards database to help teachers ensure that their lessons meet performance standards, and a resources databank through which teachers can use stored information or search the Internet for information that will enhance their lessons. The instructional planner also allows teachers to develop units or lessons collaboratively with teachers working in other classrooms or schools, thus increasing productivity and maximizing time, while raising the quality of the lesson. When assessing student work, a "mark-up" feature within Wired for Learning allows teachers to link student performance directly to the districts' academic standards.

Once teachers have developed lessons online, students are able to use Wired for Learning to access and work on their assignments both in and outside the classroom, thus effectively lengthening the school day and the school year and giving students additional time and activities to help them reach academic standards. Wired for Learning also allows students working from different locations to collaborate on the same project; students in different grades, as well as in different classrooms, can learn to work in a team and share and present information.

Wired for Learning also enables interested community members to contribute their expertise and support to their local schools. Teachers can identify university professors, museum historians, and other concerned citizens from a database of registered and approved mentors to serve as resources for specific instructional units or as online tutors. They are able to work from their homes, offices, or other networked locations at their convenience, thus eliminating time and distance constraints that act as barriers to volunteerism.

While parents, teachers, community members, and students who own an Internet-connected computer can access Wired for Learning from their home, workplace, or school, the project has taken into account that not everyone has such easy access. In Charlotte, users can access Wired for Learning from the Double Oaks Community Center, which is located in the inner city; Discovery Place, the science museum located downtown; or at school buildings within the Governor's Village—the district's new complex of revolutionary schools, which are open until 9 pm to ensure easy access for all parents. In Detroit, users can access the technology at both the Parkside and Jeffries housing developments. In Durham, users have access to Wired for Learning through a number of campus sites at Duke University.

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Microsoft Corp.: Anytime Anywhere Learning Program

Microsoft believes that the single most important use of technology is to improve education. This belief is demonstrated through its vision of and continuing efforts to help build a global "Connected Learning Community" in which all students, educators, and parents have access to technology and the tools and skills to support learning today and for a lifetime.

Microsoft's Anytime Anywhere Learning (AAL) is a simple yet powerful idea, a world in which all students and teachers have access to a personal computer and online information 24 hours a day, 7 days a week, allowing them to pursue individual paths to learning. In this world, learning does not result from access alone but from continuous, dynamic interaction among students, educators, parents, and the extended community.

Through a funding partnership between the school district and parents, students in New York City's Community District Six use their Microsoft Windows®-based laptops loaded with Microsoft Office Professional and a modem for connectivity to the Internet as a basic learner's tool kit anytime they need to, anywhere they may be. When District Six Superintendent Anthony Amato learned of this approach to technology integration, the district's original technology plan called for computer labs where students would have scheduled classes 45 minutes each week. But Amato quickly realized this approach would mean nothing to the children in terms of what computers are used for in the real world. He also knew that after graduation his students would have to compete with others who grew up with access to technology both at home and at school. Partnering with parents to purchase or lease laptop computers for students to use 100 percent of the time was an opportunity to address these issues.

Amato started the program with 26 fifth-graders and one teacher at Mott Hall School and was adamant that if he did not see a positive impact on learning and teaching, he would not expand. The teacher reported that students had a new excitement for learning, working to master each class assignment. Plus, her classroom attendance rate reached nearly 100 percent. In the second year, Amato expanded Anytime Anywhere Learning to more than 1,400 students at 16 schools and is committed to increasing participation. In 52 schools nationwide that pioneered Anytime Anywhere Learning, teachers consistently report the powerful impact that full-time access to laptop computers running Microsoft Office is having on how they teach and what students accomplish. Students are taking responsibility for their own learning and the laptop and software is allowing the teachers to customize instruction to fit each student's individual needs.

Through a resource book and Web site, Microsoft provides schools with ideas, best practices, strategies, models, and case studies, as well as connections to potential solutions for hardware, financing, insurance, and training. Microsoft and Toshiba also are funding a three-year independent evaluation to measure the impact that the use of full-featured laptops on a one-to-one ratio has on teaching and learning.

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Boston Private Industry Council: The Boston Compact's Community Learning Centers

Boston Mayor, Thomas M. Menino added a sixth educational goal, Community Learning Centers, to The Boston Compact, a set of teaching and learning goals agreed upon by key stakeholder groups in the Boston community: business, higher education, human services and cultural partners, the teachers' union, school committees, superintendents, and parents.

"By 2001, there will be computers not just in the lab, but in every classroom," said Menino during his State of the City Address at Jeremiah E. Burke High School in January 1996. "One computer for every four students and a computer for every teacher. Every school library will be linked to the six million books of the Boston Public Library. In my visits to the schools, I've seen the difference computers make, the wonder on the faces of those students. I believe it when the experts say that computers offer the breakthrough in learning we've all been waiting for."

The mayor's call to action has resulted in the connection of more than 50 percent of the city's schools and 8 community centers to the Internet with a starter network in place in each school; all 125 Boston schools are on schedule to be online by October 1998. A number of the schools have expanded their networks throughout the entire building, usually with the help of their NetDay partners who have helped wire the schools and connect them to the Internet. Boston is well on its way to putting 4,500 new computers in schools by mid-1998, a 200 percent increase over 1997. This will bring the ratio of students to computers from 63 to 1 (January 1996) to 10 to 1 (January 1997). More than $22 million has been raised from private sector, state, federal, and foundation grants to support this effort. In addition, at least 88 companies have assisted at both citywide and school levels by providing not only major monetary contributions, but also technical expertise, fundraising assistance, computer donations, and ongoing volunteer support. The Boston PIC, the convenor of The Boston Compact, also recruits business support to individual schools.

Parent and Community Involvement

Each school has a technology team that conducted a needs assessment and developed a plan for the school; this team includes parents and business partners. NetDays have been one particularly effective way for schools to reach out to their parents and community. In addition to involving parents in NetDay itself, more than half of the schools that are online have conducted family evenings to introduce parents to the new technology in their buildings.

During the summers of 1996 and 1997, thanks to corporate funding, more than 70 schools participated in a week-long Technology Institute at MIT. School teams included teachers and parents, some of whom took their only week of vacation to participate with their school. Through the institute, parents and teachers learned more about technology and about one another. In most cases these parents continued to participate on school technology teams, have become great advocates for technology in the school, and brought other parents on-board.

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AT&T: Learning Network

As a world leader in the telecommunications industry, AT&T has long been a champion of the power of effective education and has supported that belief by contributing more than $500 million in support of education since 1984. Like those of many other companies, this investment is driven by the need for a highly competitive workforce, but AT&T also recognizes and values the quality of life inspired by educated citizens.

As a company at the forefront of the information technology revolution, AT&T continues its legacy with the AT&T Learning Network, a five-year $150 million program to bring AT&T technology and extensive support services to every public and private elementary and secondary school in the United States. This initiative, a joint business and philanthropic offer, represents AT&T's single largest commitment to education to date.

Launched in 1995, the AT&T Learning Network is designed to provide all schools with access to some of the newest information technologies, including the Internet and the World Wide Web. It was important to make this program available not to just some schools, but all schools, and it was equally important to include not only access to the technology, but help in understanding how to use it. That's why the AT&T Learning Network's free online support service includes an Internet 101 teacher tutorial on how to use the Internet; a Web Tour created by education experts to guide teachers through various education-related uses of the World Wide Web; and AskLN, an exclusive mentoring program that provides coaching to teachers, by teachers, on how to integrate technology into lesson plans and classroom activities. In addition, world-class technical assistance and links and pointers to top search engines and resources help direct teachers to valuable online education content and information.

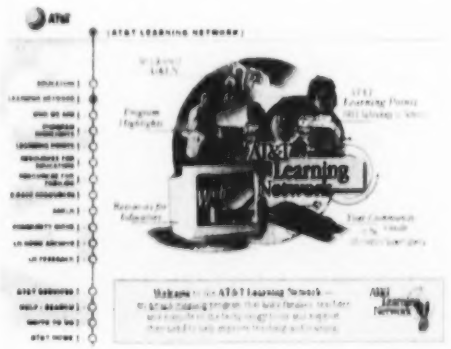
To complement the offer from AT&T's business units, the AT&T Foundation makes available AT&T Learning Network grants to help families, schools, and communities use technology to improve teaching and learning.

AT&T believes that parents are the child's first and most important teachers and, as such, essential to a child's success in school. Therefore, AT&T Learning Network grants support projects that encourage and facilitate greater family involvement in education.

The company recognizes the critical importance of well-prepared, highly motivated teachers to student achievement, and awards AT&T Learning Network grants to support professional development opportunities for teachers in the use of technology. AT&T is also concerned with the preparation of new teachers and is working with colleges of education to integrate technology into teacher preparation programs.

Believing that learning is a lifelong process, and learning how to learn is an essential survival skill for the 21st century, AT&T's Learning Network grants aim to help build the frameworks for learning communities.

The AT&T Learning Network will continue to evolve to meet the changing needs in education and the rapid advances in technology. As the company moves from NetDays to "Next Days" (beyond wiring and connecting schools), it will continue to seek broad collaboration and creative partnerships to strengthen the impact of its work. And the AT&T Learning Network will continue to symbolize the company's belief in the power of technology to enhance teaching and learning worldwide.



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Mattel Foundation/Alliance for Technology Access: Family Learning Program

The Mattel Foundation, established in 1978, is dedicated to the betterment of children's lives, which it encourages through grantmaking programs. One of the most successful of these initiatives is the Mattel Family Learning Program (MFLP).

This program began in 1990 as the IBM Writing to Read Computer Laboratory Project, a program designed to teach K–Grade 1 students to read and write in a self-contained lab environment. The project had a positive influence on the writing and reading achievement of all students, but was especially effective for students with special needs.

In 1994, the Mattel Foundation began a partnership with the Alliance for Technology Access (ATA), an agency that seeks to bring technology into the lives of children and adults with disabilities. The two shared a common goal to improve the educational achievement of all children, especially those with special needs, through the imaginative application of computer technology in classrooms across the country. Together, they refined the mission of the MFLP from providing participating schools with a Writing to Read Lab to providing schools and community centers with the opportunity to choose equipment that will complement their existing technology programs.

Advances in technology and the growing popularity and accessibility of the Internet and the World Wide Web prompted the MFLP to provide its participants with the hardware, software, wiring, and technical support necessary to go online. ATA created a closed listserv and Web site as vehicles for the schools to share resources and creations, find pen pals, and make other online connections.

Recognizing the strong and direct correlation between educational success and the involvement of the family in a child's education, the MFLP began to provide support to schools and community centers to enable them to develop after-school, family involvement programs.

These programs now provide families with opportunities outside of regular school hours to participate and learn how computers are helping children with disabilities gain self-confidence while improving their skills. Family members get to see first-hand how adaptive technology and appropriate software can support their children's attainment of educational and social goals. They benefit from seeing their children mastering something as seemingly complicated and intimidating as technology, taking center stage as "computer stars." As such, the children are able to show their siblings and peers how to use the technology. These after-school programs not only strengthen every child's ability to learn, but also strengthen the bonds between family, school, and community.

To date, the MFLP has had a profound impact on the education of more than 23,000 students across the country, including 3,018 special education students and 7,303 disadvantaged, at-risk students. Additionally, 300 teachers, special education instructors, librarians, administrators, paraprofessionals, volunteers, and parents have benefited from specialized training provided by ATA, and from the use of computer equipment provided by the Mattel Foundation.

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Nortel:
Teacher Training Program

Nortel created its Teacher Training Program to help address the computer technology needs of North Carolina local school teachers. Beginning in 1991, Nortel volunteers have spent Saturdays training teachers and administrators at the company's Research Triangle facilities. The program started by working with one local school system at a time; a full-time project manager was added in 1997 in order to expand the scope of the program and reach teachers from other parts of the state. This expansion allows teachers from across the state to register on an individual basis at no cost. More than 3,800 teachers have been trained since the program's inception.

The curriculum has grown to meet the demands of teachers who need to know much more than basic word processing and spreadsheet development. The present course offerings include more than 16 courses in both Macintosh and PC environments. Some of the more popular courses are PowerPoint, Excel, PrintShop, World Wide Web, Networking, Upgrading/ Troubleshooting Your PC, and FrontPage. Nortel's program will soon equip teachers with advanced techniques for navigating the World Wide Web and using the other applications to integrate computer technology into their daily instruction. As teachers became more familiar with the Web, networking and Web page design were added to the curriculum.

The key to the success of the program must be attributed to Nortel's employee volunteers. More than 40 employees are involved on a regular basis to deliver these courses on Saturdays at the company's local Technical Education Center. Many of the volunteers helped develop and write training manuals that could be given to the teachers at the end of their classes. These manuals were custom-designed to match the needs of the education community. As the program grew, Nortel hired external writers to keep up with the demand for new course offerings.

The program is now positioned to be a major factor in North Carolina's education reform efforts. The program offered has been approved for Continuing Education Credit as part of North Carolina's teacher certification requirements. As a result of this approval, Nortel will be able to train 1,300 teachers per year. The Nortel Teacher Training Program plays a key role in the development of North Carolina's teachers as they prepare the leaders of tomorrow—today's children.

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Cisco Systems, Inc.
Cisco Networking Academy Program

Cisco Systems' worldwide education program is helping schools to prepare the future workforce for success in the 21st century. The company launched a new partnership called Cisco Networking Academy Program in October 1997. Through a partnership of schools, government, and industry, this program teaches high school and college students to design, build, and maintain computer networks.

The program attempts to provide a turnkey solution to schools. First, the program offers a four-semester, multimedia, Web-based curriculum that will continually evolve to include new concepts. Second, it provides a complete suite of lab equipment on which students can practice their skills, teacher training, and support for the curriculum and the equipment. Third, students who can demonstrate competence after completing the curriculum acquire a marketable certificate. Last, through this Web-based virtual community, academies can also share insights on all aspects of the program, including its strengths and weaknesses.

The Cisco Networking Academy Program does not simply drop technology into the classroom together with a short-term teacher training module; rather, they intend to provide virtually everything a school needs to effectively and economically teach students how to build and maintain networks. Students graduating from this program will be strong network administrators, designers, and troubleshooters because they will have substantial experience doing these jobs on real networks.

In April 1997, the curriculum was tested when students from Thurgood Marshall Academic High School in San Francisco were brought to the San Jose Convention Center. In less than a day, these students designed, installed, and configured a 70-node trade show network for the California Community College Foundation. This network, using the latest technologies, connected all trade show booths and conference rooms. The network operated flawlessly throughout the three days of the trade show.

The Cisco Networking Academy Program has already demonstrated benefits for all partners. Students enjoy the fun-to-use curriculum that provides job skills leading to gainful employment in information technology jobs. Student classroom time is divided between using the multimedia curriculum with its animations, pictures, examples, and exercises, and actually configuring and operating real network equipment in the lab. While the students are learning the skills essential to network administration, they are building reading, writing, and math skills through the required project and other assignments.

Teachers receive motivated students and knowledge critical to the information economy. Schools get a relevant new curriculum and, perhaps more importantly, people to help maintain their computer networks. Students, under proper supervision, are encouraged to learn about and help maintain the networks of not only their own school, but also of other schools in the area.

Industry is excited about the opportunity to hire certified graduates from the Cisco Networking Academy Program. Cisco will do what it can to hire them; the company will also do what it can to bring together hiring managers and program graduates, although it will take care to ensure that it does not create a bottleneck to this enormous endeavor.

Since the program was launched, it has been established in 946 high schools, colleges, and technical schools in 47 states and several countries. By the fall 1998, the program is expected to be established in all 50 states and in many additional countries.

Contact: www.cisco.com/edu

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FamilyEducation Network: A Free and Simple Web Site

FamilyEducation Network has built an easy-to-use, free, interactive bridge between home, school, and community that helps generate family involvement in education. This service is changing the face of parent-teacher communications for the 21st century.

Because it is free and easy to use, more than 30 million parents are able to utilize this accessible, unique Web site. Recently rated the best family Web site in a survey of parents by *FamilyPC* magazine (November 1997), FamilyEducation Network is the first nationwide information service for parents that connects them with their children's schools and with other parents, both within their communities and across the country.

With thousands of pages of information on trends in education, free tools that help schools activate family involvement, a customizable home page, interactive bulletin boards and e-mail on the Web site, online technical assistance, and promotional support to help launch the school district's Web site, each school district Web site invites parents to learn more about their children's schools and the educational world at large. Each page keeps schools connected to national and local trends, policy makers, and experts by supplying fresh editorial features and interactive tools, state resources, local news and weather, as well as two dozen simple templates in which the schools can highlight important information about everything from sports schedules to lunch menus to curriculum and homework assignments.

To build this family involvement service, FamilyEducation Network is partnering with organizations such as the American Association of School Administrators, the National PTA, National School Boards Association, and Communities in Schools.

In addition to enhancing communication with parents and these groups, FamilyEducation Network encourages state and national discussion by allowing schools to share important information and best practices with one another.

In the United States today, most parents work outside the home and many cannot be the active participants they would like to be in their children's lives. Many families do not have home computers. But FamilyEducation Network is helping parents to break from these traditional limitations and become more involved in their children's education. This free site can be accessed by computers at public libraries, school computer labs, other community centers, and from the office.

So, whether parents are working from nine to five or doing home schooling, whether or not they have a computer at home, or whether they live in a suburban, rural, or urban area, they can still find out about their child's community, homework assignments, and what school activities are in the pipeline through FamilyEducation Network at www.familyeducation.com.

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Scholastic Inc./Center for Applied Special Technology: WiggleWorks

In 1992, Scholastic Inc., a leading publisher of classroom materials, began its collaboration with CAST (Center for Applied Special Technology), a not-for-profit think tank of educators and technology specialists. This partnership resulted in the publication of WiggleWorks, the first large-scale, commercial early-literacy series (72 books in print form) that also incorporates universally designed CD-ROMs for each book.

Universally designed software is usable by everyone, including children with learning disabilities, physical challenges, sensory impairments, and those with other reading challenges—as well as those with extraordinary abilities.

In this unique partnership, Scholastic brought to CAST all the power and reach of a major publisher of educational materials. CAST brought to Scholastic an understanding of universal design and how digital technology can shape instructional materials to accommodate different access needs, learning styles, interests, abilities, and linguistic backgrounds.

By working together, Scholastic and CAST produced a breakthrough product that has achieved extraordinary market penetration and has become a landmark for early-literacy development. This award-winning series grew into a multi-platform product, for the school and home markets, in both English and Spanish.

In the process of producing WiggleWorks, CAST helped Scholastic realize its goal of designing mainstream educational materials that work for everyone; this concept of universal design has dramatically transformed Scholastic's thinking about how to produce educational products. Scholastic also benefited from CAST's knowledge of new brain research and how that data can inform the development of instructional materials.

By being invited to participate in Scholastic's editorial process, focus groups, and sales meetings, CAST learned the importance of designing educational software for teachers and the real-life demands of the classroom. Both Scholastic and CAST made it a priority to work hand-in-hand with educators in the field to design the highest-quality and most useful product possible.

CAST also learned from Scholastic that the design of first-rate learning tools is only half the challenge in broadening learning opportunities for students; the other half is the importance of high-quality graphic, audio, and interface design, smart marketing, and strategic delivery of the product to teachers and students. CAST could not have begun to produce or market the accessible software tools embedded in WiggleWorks without partnering with Scholastic. Scholastic and CAST worked together to bring well-researched pedagogy to life.

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Acknowledgments

The author wishes to thank the following for their support and guidance of this project: Adriana de Kanter, Linda Roberts, Jenelle Leonard, Leah Vosburgh, Alan Ginsburg, and Menahem Herman of the U.S. Department of Education; Les Hemmings, John Hancock Financial Services; Robin Willner, IBM Corporation; Carroll Miller, FamilyEducation Company; Bess Stephens, Hewlett-Packard Company; Mort Egol, Arthur Andersen & Co.; Edgar Murphy, Nortel/Northern Telecom; Marilyn Reznick, AT&T Foundation; Leanne Barrett, WFD, Inc.; Jane Broom, Microsoft Corp.; Jo Corro, Boston Private Industry Council; Russ Holland, Alliance for Technology Access; Steve Spanier, Cisco Systems, Inc.; Catherine Cook, Center for Applied Special Technology; Anne Schreiber, Scholastic; and Stephen Garone, The Conference Board.

U.S. Department of Education
Washington, D.C. 20202-8173